

Integrating Medical Ethics into the Undergraduate Physiology Curriculum: A Pilot Feasibility Study in Delhi Medical Institutions

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Abstract

Medical ethics education has traditionally received limited emphasis in India's undergraduate medical programs. The National Medical Commission's recent formal integration of medical ethics into the new competency-based medical education (CBME) curriculum is therefore a commendable step. However, a key group of stakeholders—the teachers—has largely been overlooked in this process. This study aimed to explore the perspectives of physiology faculty in Delhi regarding the implementation of ethics teaching within the CBME framework. We conducted a preliminary, questionnaire-based study to assess feasibility in a cross-sectional, observational design. The study targeted senior residents (post-MD) and faculty members from the Physiology departments of nine medical colleges in Delhi, with data collected over the period of February to October 2020.

Out of 79 individuals invited, 60 responded, yielding a 76% response rate. Among the respondents, 24 (40%) were senior residents and 36 (60%) were faculty members. Approximately 55% (33 participants) distinguished between bioethics and clinical ethics, while 53% (32 participants) felt that ethics education could be delivered effectively in large-group sessions. A majority, 75% (45 participants), believed that physiology faculty should take primary responsibility for teaching ethics rather than clinical faculty, and 61.7% (37 participants) supported its inclusion in formative assessments. Participants also identified key ethical topics to be incorporated into the physiology curriculum and suggested the most suitable instructors for these topics to facilitate integration. Despite potential challenges, 65% (39 participants) considered ethics teaching an essential, inseparable component of physiology education across all teaching formats. Participants favored early clinical exposure over the Ethics, Attitude, and Communication (AETCOM) program. By applying the “five W's and one H” framework, we outline how our findings can serve as a practical guide for physiology educators in integrating ethics teaching into the new competency-based medical education (CBME) curriculum.

Keywords: Clinical ethics, Undergraduate medical education, Medical ethics, Physiology, Competency-based medical education

Introduction

The 1910 Flexner Report significantly reshaped medical education in the US and Canada. Despite this, Flexner's guidance on practicing medicine ethically and compassionately was largely overlooked, as the focus shifted toward “curative rather than caring medicine” [1].

In his later writings, he emphasized the importance of humanities and ethics in forming professional identity, but these aspects were absent from his original report. Furthermore, the preclinical emphasis on dissection and vivisection by basic science instructors may have contributed to student desensitization, raising concerns about the early dehumanization of medical trainees [1]. These issues gained global attention in the early 1990s, when medicine faced criticism for being “inhuman,” and ethics was still an optional component of medical education [2]. A survey across 32 Indian medical colleges also highlighted the need to integrate ethics into preclinical teaching to broaden its scope and humanize practical sessions, mitigating excessive

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compartmentalization [3]. These developments began attracting international recognition [4].

In line with such global reforms, the former Medical Council of India (now National Medical Commission, NMC) introduced competency-based medical education (CBME), implemented nationwide in August 2019 [5]. CBME incorporates modern teaching strategies, including Early Clinical Exposure (ECE) in Phase I and a structured longitudinal Attitude, Ethics, and Communication (AETCOM) program across the curriculum [6]. This framework aligns the five roles of an Indian Medical Graduate with global standards—mirroring the six ACGME competencies in the US and the six CanMEDS roles in Canada—and facilitates the integration of ethics from the first year via AETCOM [7]. Despite these reforms, there is uncertainty about whether faculty, particularly from traditionally “non-clinical” departments, are sufficiently prepared and trained to implement ethics education.

Introducing ethics at the CBME Phase I level is crucial, as first-year students have little prior exposure. While 90 hours of ECE are divided among Anatomy, Physiology, and Biochemistry, the 34-hour AETCOM module is described only as a longitudinal program. The NMC guidelines do not clarify how these hours should be distributed among Phase I disciplines or who should lead specific modules—whether it will be faculty from each department, interdepartmental committees, or medical education unit members. For comparison, the WHO recommends a minimum of 20 hours for teaching core topics in undergraduate medical ethics [4].

This pilot feasibility study was designed to examine the gap between existing practices and curricular requirements. Using the feasibility framework by Bowen *et al.* [8], we assessed physiology educators’ readiness, their willingness to adopt and integrate ethics teaching, and the challenges they face in incorporating ethics into the CBME curriculum.

Materials and Methods

This online pilot study used a cross-sectional, observational design with a questionnaire to collect data. The participants included faculty members and senior residents (post-MD) from the Departments of Physiology at nine medical colleges in Delhi, conducted between February 2020 and October 2020. The participating institutions represented different administrative categories: Central Government colleges — Maulana

Azad Medical College, Lady Hardinge Medical College, and University College of Medical Sciences under the University of Delhi [1–3]; State University colleges — Atal Bihari Vajpayee Institute of Medical Sciences, Army College of Medical Sciences, and Vardhman Mahavir Medical College under Guru Gobind Singh Indraprastha University [4–6]; a Government of Delhi college — Dr Baba Saheb Ambedkar Medical College [7]; a Municipal Corporation college — North Delhi Municipal Corporation Medical College [8]; and a private institution — Hamdard Institute of Medical Sciences & Research [9]. The All India Institute of Medical Sciences, New Delhi, was excluded because it functions autonomously, is not under the National Medical Commission, and does not implement the competency-based medical curriculum.

Faculty and senior residents were invited to participate through emails and social media platforms. Senior residents were included due to their involvement in teaching undergraduate physiology. Participants accessed the questionnaire via a Google Form link, which included 16 items across different domains: preparedness (Q1), acceptance (Q2, Q3, Q4, Q5, Q6, Q9, Q12), implementation (Q7, Q8, Q10, Q11), adaptation and integration (Q13, Q14, Q16), and challenges (Q15). Most items used a Likert scale from “strongly disagree” to “strongly agree,” while three questions were open-ended to capture participants’ views on adaptation, integration, and challenges. Completing the questionnaire required less than 10 minutes and could be done at the participants’ convenience.

Ethical approval was waived by the lead author’s institutional ethics committee (IEC-HR/2019/41/131R). No personal identifiers were collected, and participant confidentiality was strictly maintained. Participation posed no risk, and individuals could withdraw at any point without any consequences. The collected data were securely stored in a password-protected Excel file and analyzed descriptively.

Results and Discussion

A total of 79 eligible physiology educators from the nine medical colleges in Delhi were invited to participate. Of these, 60 individuals responded, yielding a response rate of 76%. The respondents comprised 24 senior residents (40%) and 36 faculty members (60%). Among the faculty, 8 were assistant professors (22%), 5 were

associate professors (14%), and 23 held the positions of professor or director professor (64%).

Preparedness

Just over half of the participants (33, 55%) indicated that bioethics and clinical medical ethics should be regarded as separate fields, while respondents (21, 35%) viewed them as equivalent. Nearly one-third ($n = 20$) felt that teaching ethics in very large classes of 150 or more students is impractical, a concern that is particularly relevant in Indian medical colleges where class sizes can reach 275–300 students. Despite this, a slight majority (32, 53%) believed that it is still possible to deliver ethics education effectively in large-group formats.

Acceptance

Acceptability refers to how an intervention, such as (CBME), influences its intended recipients, here being (physiology educators), during the rollout of the (AETCOM) program. A large proportion of respondents (53, 88%) considered ethics instruction to be a fundamental component of physiology education (**Table 1**). Despite the fact that medical students in the United States typically start at an older age (around 17–18 years), most participants (39, 65%) felt that first-year medical students in India are sufficiently prepared to comprehend ethical principles within the context of physiology, countering common assumptions.

Table 1. Overview of physiology educators' readiness, acceptance, and execution of ethics instruction within the CBME framework

Domain & Statement	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Preparedness					
Bioethics and clinical medical ethics are the same thing	4 (6.7%)	29 (48.3%)	6 (10.0%)	19 (31.7%)	2 (3.3%)
Acceptance					
Ethical issues are essential to physiological research	1 (1.7%)	5 (8.3%)	1 (1.7%)	24 (40.0%)	29 (48.3%)
Ethics teaching in physiology should be part of undergraduate medical education	4 (6.7%)	5 (8.3%)	1 (1.7%)	24 (40.0%)	26 (43.3%)
Ethics teaching should only be for clinical subjects	21 (35.0%)	27 (45.0%)	3 (5.0%)	7 (11.7%)	2 (3.3%)
Ethics teaching in physiology should be part of postgraduate education	3 (5.0%)	3 (5.0%)	1 (1.7%)	27 (45.0%)	26 (43.3%)
Teaching ethics is not the responsibility of physiology faculty or residents	15 (25.0%)	30 (50.0%)	9 (15.0%)	4 (6.7%)	2 (3.3%)
First-year medical students are not ready to learn ethics in physiology	10 (16.7%)	29 (48.3%)	6 (10.0%)	9 (15.0%)	6 (10.0%)
Ethics cannot be effectively taught in large classes (150+ students)	2 (3.3%)	30 (50.0%)	8 (13.3%)	11 (18.3%)	9 (15.0%)
Implementation					
Adding AETCOM modules to the current physiology curriculum creates problems	8 (13.6%)	20 (33.9%)	13 (22.0%)	17 (28.8%)	1 (1.7%)
Ethics should be integrated into physiology lectures and practicals throughout first-year MBBS	2 (3.3%)	12 (20.0%)	7 (11.7%)	25 (41.7%)	14 (23.3%)
Ethics sessions in physiology should be part of formative assessment	3 (5.0%)	14 (23.3%)	6 (10.0%)	34 (56.7%)	3 (5.0%)
Ethics sessions in physiology should be part of summative (university) assessment	3 (5.0%)	20 (33.3%)	9 (15.0%)	23 (38.3%)	5 (8.3%)

About half of the respondents ($n = 26$) expressed strong support for integrating ethics education into both undergraduate and postgraduate physiology programs. A large majority (48, 80%) rejected the view that ethics instruction should be restricted to clinical disciplines, while 45 participants (75%) considered that teaching

ethics should primarily be undertaken by physiology faculty or senior residents.

Implementation

Implementation refers to how thoroughly and effectively an intervention can be delivered according to its original design. Although educators recognized the importance of

ethics instruction in physiology, they held differing opinions on its assessment. About (37, 61.7%) supported including ethics in formative assessments, while nearly half (28, 47%) felt it should also feature in summative evaluations. A majority (39, 65%) agreed that ethics content should be incorporated into both lectures and practical sessions during the first professional year. However, 18 respondents (30.5%) viewed the integration of AETCOM modules into the existing physiology curriculum as challenging, whereas 28 (47.5%) did not share this concern.

Adaptation and integration

Adaptation involves modifying a program's content to suit a new context, whereas integration refers to the extent of systemic change needed to embed a new process within an existing curriculum or infrastructure.

Table 2 summarizes the ethical topics that respondents

recommended including in physiology courses to facilitate effective adaptation to CBME, along with the preferred instructors for achieving integration. Despite the potential challenges, most respondents (39, 65%) supported incorporating ethics education across all teaching formats, including didactic lectures (3, 5%), practical sessions (6, 10%), early clinical exposure (ECE, 16, 26.7%), and the AETCOM module (10, 16.7%). While respondents recognized the value of all instructional modalities for ethics teaching, they felt that ECE offers a more effective opportunity than the NMC-mandated AETCOM module.

Challenges

The primary challenges identified by respondents (n = 48) regarding the integration of ethics into undergraduate physiology education, listed in order of frequency along with illustrative quotes, are presented in **Table 2**.

Table 2. Overview of physiology educators' views on ethics content and the most appropriate facilitators for teaching ethics within the CBME framework

Domain	Key Themes	Exemplar Quotes
Adaptation and Integration		
Ethical topics that can be integrated into physiology curriculum	- Informed consent - Patient autonomy, privacy, and confidentiality - Doctor-patient relationship - Responsible animal experimentation - Research ethics - Plagiarism and reporting accurate practical results - Professional conduct and use of social media - Teacher-student relationship (avoiding teaching by humiliation) - Communication skills during sample collection/clinical examination - Wellness, respect for life, end-of-life issues - Becoming "good humans"	"Both clinical medical and bioethics need to be integrated." "Reporting the exact values obtained in physiology practical rather than the ideal ones." "Teaching them that they ought to be GOOD HUMANS – at all times." "Using social media professionally."
Best persons to teach/learn ethics from	- Faculty formally trained in ethics - Bioethicists, philosophers, external experts - Patients and clinical faculty (Medicine, Psychiatry, Forensic, Community Medicine) - All medical teachers, residents, and Medical Education Unit members - Ethics committee members, researchers, retired faculty - Role models who actually practice ethics - Parents and public figures	"Ethics should be reinforced by all people that surround a medical student, so that it becomes a behaviour rather than just lessons." "Those who themselves follow ethics (rare to find one)."
Preferred modes of including ethics teaching in physiology	Most educators selected: e) All of the above (i.e., lectures, practicals, early clinical exposure, and AETCOM modules)	(Multiple-choice selection; majority chose "all of the above")
Challenges	Main barriers identified:	
Challenges in incorporating ethics into undergraduate physiology education	- Lack of faculty/residents trained in ethics - Severe time constraints - Overburdened existing curriculum - Large batch sizes - Repetition of ethics content (Foundation course → later years) leading to boredom - First-year students perceived as too young/naive - Limited patient interaction in preclinical phase - Non-MBBS (non-medical) faculty teaching CBME subjects - Lack of motivation among faculty and students - Difficulty finding role-model teachers who consistently follow ethics	"Time limitations, lack of structured course for teaching and evaluation and lack of motivation..." "Students are already burdened with the existing curriculum." "To find an educator who follows ethics [is a challenge]." "First year MBBS students are too young to fully grasp the importance of ethics... Nevertheless, efforts

should be made to mold their young minds.”

“Every physiological case carries an ethical dimension as well.” [9]

– Dr. Edward Hundert (Dean of Medical Education, Harvard Medical School)

In India, medical ethics has traditionally received limited focus within the undergraduate curriculum. Recent revisions have redefined physiology, moving it beyond a purely “preclinical” or “non-clinical” subject. Curriculum innovations, including the introduction of clinical physiology and the longitudinal integration of ethics throughout medical training, represent a step toward more applied and patient-centered education. Due to the limited training and awareness on implementing AETCOM effectively, we adopt the framework of five W’s (what, why, where, when, and who) and one H (how) to organize our findings, providing a practical guide for physiologists to incorporate ethics teaching into CBME, with a focus on physiology.

The rationale for teaching medical ethics in physiology (why)

A survey spanning 45 countries highlighted a significant gap in medical education: although the inclusion of ethics was widely regarded as necessary, most physiology programs (69%) had yet to incorporate ethics into their curricula [10]. Ethical principles are integral to physiological research [11], but discussions have largely centered on research ethics rather than integrating ethics into the teaching of physiology itself. Recognizing the need for formal instruction, the World Medical Association issued a recommendation in 1999 mandating the teaching of medical ethics and human rights in all medical schools, a directive that was reaffirmed and updated in October 2015 [12]. Reflecting these global standards, most respondents in our study supported the introduction of ethics education at both undergraduate and postgraduate levels within physiology courses.

Development of clinical medical ethics in physiology (what)

In 2001, the Council of the International Union of Physiological Sciences introduced an ethical guideline, though its application was limited to research involving human and animal subjects [13]. However, ethics education encompasses far more than research considerations alone. Recently, Clinical Medical Ethics has gained renewed emphasis as a distinct area, separate

from bioethics, philosophical, legal, or theoretical ethics. Pioneered by Mark Siegler, this discipline positions ethics as a core aspect of clinical practice, requiring clinicians to apply ethical principles in their routine patient interactions [14]. This approach emphasizes that students should actively practice ethical decision-making rather than simply learning about it in theory [15]. The shift toward competency-based medical education, with elements such as early clinical exposure and integrated teaching, has repositioned physiology as a bridge to applied medicine rather than a purely preclinical subject. Furthermore, educators have proposed strategies to nurture humanistic skills within CBME starting from the first year of medical training [16].

Who should teach medical ethics in physiology?

The question of who should lead ethics education remains unresolved, with our respondents suggesting a wide range of possibilities. Bioethics advocates often favor instruction by philosophers, legal experts, and other non-medical professionals, whereas proponents of Clinical Medical Ethics emphasize learning through real-world clinical practice, encouraging students to “walk the talk,” particularly under the competency-based medical education (CBME) framework [14]. In India, the NMC has reduced the appointment of non-medical faculty in departments such as Anatomy, Physiology, Biochemistry, Pharmacology, and Microbiology following CBME implementation. Since CBME integrates clinical exposure from the very first year, non-medical faculty must receive adequate training, including completion of the revised three-day basic medical education program within a month of joining. Currently, medical ethics instruction largely reflects Western cultural norms, as it is widely taught in high-income countries [17]. To be effective, however, ethics education should be customized to the cultural and societal context of the students [18]. For example, Western ethics draws on thinkers like Kant and Mill, whereas Eastern traditions are shaped by Buddhism, Hinduism, and philosophers such as Confucius and Lao Tzu. This underscores the need for a multidisciplinary team of facilitators who can adapt content to local contexts and provide students with a culturally relevant and practical ethics education.

Where should medical ethics be incorporated in physiology?

Medical ethics should be integrated throughout the curriculum rather than treated as an optional or supplementary topic. Relying solely on AETCOM to teach ethics presents limitations, as it risks framing the subject as a specialized domain accessible only to a few [19]. Many faculty members perceive it as the responsibility of Medical Education Units and tend to disengage from its teaching. Historically, well-established models of integrated ethics education have predominantly emerged from high-income countries [20, 21]. In India, St. John's Medical College in the south pioneered an innovative pilot program, "Thinking Ethics," which embedded ethics within the physiology curriculum instead of confining it to separate departmental courses [15]. Students reported that the program was "thought-provoking, novel, relevant, and well-integrated."

Building on this success, a scaled-up integrated ethics curriculum was implemented across three medical colleges in Karnataka, where both students and external observers found it feasible and effective [22]. Feedback from Indian and US students emphasized that ethics should not be isolated to physiology but incorporated across the broader framework of critical thinking and medical training [15, 19, 23]. Despite the proven success of these initiatives, CBME implementation largely overlooked them, highlighting the importance of using context-tested Indian models rather than relying solely on AETCOM.

Since the introduction of AETCOM, ethics teaching has been incorporated into diverse components of the curriculum. These include foundation courses (student debates on professionalism and social media, trigger films for medical and nursing students), disability competencies modules, didactic lectures (history of medicine, disorders/differences of sex development, transgender health in reproductive physiology), practical sessions addressing ethical dilemmas (confidentiality, privacy, gender identity, coercion, haematological disabilities such as saviour siblings and prenatal diagnosis of haemoglobinopathies), AETCOM sessions (doctor-patient relationships), Early Clinical Exposure activities (dialysis and renal transplantation), and summative assessments (short-answer questions in term examinations).

How and when should medical ethics in physiology be taught?

Ethics education in physiology can benefit from both small and large group formats. Yet, there is a growing emphasis on shifting toward student-centered approaches that encourage open-ended, self-directed learning, even if some sessions do not lead to definitive conclusions [15, 19]. The AETCOM module mainly relies on case studies through a problem-solving framework, which some humanists argue may limit critical thinking [16]. Furthermore, case studies that are heavily based on Western contexts could suppress creativity and innovation, running counter to the goals of teaching ethics and embracing diversity. Feedback from our survey highlighted issues such as the use of humiliation as a teaching method and inappropriate engagement on social media, both of which merit discussion and debate in the classroom. The history of medicine offers a rich backdrop for exploring diverse ethical dilemmas in physiology. Additionally, health humanities provide dynamic and interactive tools—such as theatre of the oppressed, poetry, narrative medicine, disability and intersex studies, and film—to foster ethical awareness [16]. In our experience, we have employed Forum Theatre, poetry, visual arts, storytelling, trigger films, and reflective narratives to teach ethics within physiology [24].

Content recommended by Goswami *et al.* [10] and Savitha *et al.* [22, 25] aligns closely with the perspectives of our respondents. We contend that ethics is an inseparable aspect of medical education and can be embedded across different teaching methods. Supporting this, an Indian study found that integrating ethics sessions did not disrupt standard physiology teaching for 59–66% of students across three medical colleges [25]. Similarly, physiology educators from Delhi in our study emphasized that ethics should be included not only in AETCOM but also across didactics, practical sessions, and early clinical exposure (ECE) within the CBME framework.

Strengths and limitations of the study

Our study explored the perspectives of senior residents (post-MD), who are actively involved in both didactic and practical teaching and maintain more frequent and closer interactions with students than senior faculty. Previous research has largely overlooked this crucial group. Residents function as near-peers to undergraduate students, and existing literature supports the engagement

of near-peers in ethics education to help bridge the gap between theoretical knowledge and practical application [26, 27]. This approach also helps mitigate faculty shortages—exacerbated by NMC reductions—in preclinical and paraclinical disciplines. Additionally, Delhi, as India's capital and a policy-making hub, hosts several respondents from prominent institutions. Policymakers often place greater reliance on two nationally significant institutions in and around Delhi when considering curricular reforms. Unfortunately, the first institution has not yet transitioned to a competency-based curriculum, though it participates in committees developing such curricula for other medical schools, while the second institution lacks undergraduate teaching entirely. Our study amplifies the voices of those actively engaged in teaching, rather than solely those who influence policy.

This study has some limitations. Firstly, the sample size is small, reflecting only the needs assessment of physiology educators in Delhi. Secondly, it does not include the perspectives of students. We addressed this gap by integrating findings from Indian studies that incorporated student feedback into our discussion.

Conclusion

The NMC should be acknowledged for formally incorporating medical ethics into the new CBME framework. However, they overlooked a critical group—the faculty—who are ultimately responsible for implementing CBME in practice. Contrary to the prescribed approach, our respondents felt that ethics should be integrated throughout physiology teaching, including didactic sessions, practicals, ECE, and AETCOM, rather than being confined to a separate AETCOM module. Ethics education is a collective responsibility and should not be left to only a select few. Strengthening faculty and resident capacity, along with employing innovative teaching tools, is essential to foster a culture of ethical awareness and change. We hope this study, among the few of its kind in India, contributes to guiding further refinements in the way ethics is taught to undergraduate medical students.

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